

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

- 1 1. (Previously presented) A method for dissecting a layout of an integrated
2 circuit based on modeled intensity gradients to produce a segmentation for an
3 optical proximity correction (OPC) process, comprising:
4 receiving the layout for the integrated circuit;
5 performing a model-based simulation on the layout to generate intensity
6 gradients along edges of features in the layout, wherein the intensity gradients
7 include both magnitude and angle and wherein an intensity gradient angle can be
8 in any direction with respect to an edge; and
9 generating a segmentation for edges in the layout based upon the intensity
10 gradients, wherein the segmentation is used by a subsequent OPC process in
11 generating corrections for the layout;
12 wherein the OPC corrected layout is used to generate a mask for
13 fabricating an integrated circuit.

- 1 2. (Original) The method of claim 1, wherein generating the segmentation
2 involves:
3 determining segment lengths for edges in the layout based upon the
4 intensity gradients along the edges; and
5 using the segment lengths to dissect the edges in the layout, thereby
6 generating the segmentation for the layout.

1 3. (Previously presented) The method of claim 2, wherein identifying a
2 segment length for an edge involves using a predetermined association to map an
3 intensity gradient angle to the segment length.

1 4. (Original) The method of claim 1, wherein generating the segmentation
2 involves selecting a segmentation for a line-end in the layout from a set of
3 predetermined line-end segmentations based upon intensity gradients associated
4 with the line-end.

1 5. (Previously presented) The method of claim 4, wherein the
2 segmentation for the line-end is selected based upon a magnitude of an intensity
3 gradient associated with the line-end.

1 6. (Original) The method of claim 1, wherein performing the model-based
2 simulation on the layout involves:
3 dividing each edge in the layout into minimum-sized segments; and
4 performing a model-based simulation to determine an intensity gradient
5 for each minimum-sized segment.

1 7. (Original) The method of claim 6, wherein determining a gradient for a
2 given minimum-sized segment involves performing a model-based simulation at
3 two tangential points along the segment to determine a tangential component of
4 the gradient.

1 8. (Original) The method of claim 7, wherein determining the gradient for
2 the given minimum-sized segment involves performing a model-based simulation
3 at two points along a normal to the segment to determine a normal component of
4 the gradient.

1 9. (Original) The method of claim 1, further comprising performing the
2 dissection again on problem areas in the layout after initial OPC operations take
3 place.

1 10. (Original) The method of claim 1, further comprising reducing the
2 number of segments in areas that prove to be simpler to correct than predicted
3 after initial OPC operations take place.

1 11. (Original) The method of claim 1, wherein prior to receiving the
2 layout, the method further comprises calibrating the association between gradients
3 and segment lengths by:
4 modeling an intensity gradient across a test pattern;
5 identifying target regions in the test pattern that have a large amount of
6 correction shift variation;
7 mapping intensity gradients to the target regions;
8 associating segment lengths with the target regions; and
9 producing an association between intensity gradients and segment lengths
10 in the target regions, whereby the association is subsequently used in generating
11 the segmentation for the layout.

1 12. (Previously presented) A computer-readable storage medium storing
2 instructions that when executed by a computer cause the computer to perform a
3 method for dissecting a layout of an integrated circuit based on modeled intensity
4 gradients to produce a segmentation for an optical proximity correction (OPC)
5 process, the method comprising:
6 receiving the layout for the integrated circuit;
7 performing a model-based simulation on the layout to generate intensity
8 gradients along edges of features in the layout, wherein the intensity gradients

9 include both magnitude and angle and wherein an intensity gradient angle can be
10 in any direction with respect to an edge; and
11 generating a segmentation for edges in the layout based upon the intensity
12 gradients, wherein the segmentation is used by a subsequent OPC process in
13 generating corrections for the layout;
14 wherein the OPC corrected layout is used to generate a mask for
15 fabricating an integrated circuit.

1 13. (Original) The computer-readable storage medium of claim 12,
2 wherein generating the segmentation involves:
3 determining segment lengths for edges in the layout based upon the
4 intensity gradients along the edges; and
5 using the segment lengths to dissect the edges in the layout, thereby
6 generating the segmentation for the layout.

1 14. (Previously presented) The computer-readable storage medium of
2 claim 13, wherein identifying a segment length for an edge involves using a
3 predetermined association to map an intensity gradient angle to the segment
4 length.

1 15. (Original) The computer-readable storage medium of claim 12,
2 wherein generating the segmentation involves selecting a segmentation for a line-
3 end in the layout from a set of predetermined line-end segmentations based upon
4 intensity gradients associated with the line-end.

1 16. (Previously presented) The computer-readable storage medium of
2 claim 15, wherein the segmentation for the line-end is selected based upon a
3 magnitude of an intensity gradient associated with the line-end.

1 17. (Original) The computer-readable storage medium of claim 12,
2 wherein performing the model-based simulation on the layout involves:
3 dividing each edge in the layout into minimum-sized segments; and
4 performing a model-based simulation to determine an intensity gradient
5 for each minimum-sized segment.

1 18. (Original) The computer-readable storage medium of claim 17,
2 wherein determining a gradient for a given minimum-sized segment involves
3 performing a model-based simulation at two tangential points along the segment
4 to determine a tangential component of the gradient.

1 19. (Original) The computer-readable storage medium of claim 18,
2 wherein determining the gradient for the given minimum-sized segment involves
3 performing a model-based simulation at two points along a normal to the segment
4 to determine a normal component of the gradient.

1 20. (Original) The computer-readable storage medium of claim 12,
2 wherein the method further comprises performing the dissection again on problem
3 areas in the layout after initial OPC operations take place.

1 21. (Original) The computer-readable storage medium of claim 12, further
2 comprising reducing the number of segments in areas that prove to be simpler to
3 correct than predicted after initial OPC operations take place.

1 22. (Original) The computer-readable storage medium of claim 12,
2 wherein prior to receiving the layout, the method further comprises calibrating the
3 association between gradients and segment lengths by:
4 modeling an intensity gradient across a test pattern;

5 identifying target regions in the test pattern that have a large amount of
6 correction shift variation;
7 mapping intensity gradients to the target regions;
8 associating segment lengths with the target regions; and
9 producing an association between intensity gradients and segment lengths
10 in the target regions, whereby the association is subsequently used in generating
11 the segmentation for the layout.

1 23. (Previously presented) An apparatus that dissects a layout of an
2 integrated circuit based on modeled intensity gradients to produce a segmentation
3 for an optical proximity correction (OPC) process, comprising:
4 a receiving mechanism configured to receive the layout for the integrated
5 circuit;
6 a model-based simulator configured to perform a model-based simulation
7 on the layout to generate intensity gradients along edges of features in the layout,
8 wherein the intensity gradients include both magnitude and angle, and wherein an
9 intensity gradient angle can be in any direction with respect to an edge; and
10 a segmentation mechanism configured to generate a segmentation for
11 edges in the layout based upon the intensity gradients, wherein the segmentation is
12 used by a subsequent OPC process in generating corrections for the layout;
13 wherein the OPC corrected layout is used to generate a mask for
14 fabricating an integrated circuit.

1 24. (Original) The apparatus of claim 23, wherein the segmentation
2 mechanism is configured to:
3 determine segment lengths for edges in the layout based upon the intensity
4 gradients along the edges; and to

5 use the segment lengths to dissect the edges in the layout, thereby
6 generating the segmentation for the layout.

1 25. (Previously presented) The apparatus of claim 24, wherein while
2 identifying a segment length for an edge, the segmentation mechanism is
3 configured to use a predetermined association to map an intensity gradient angle
4 to the segment length.

1 26. (Original) The apparatus of claim 23, wherein the segmentation
2 mechanism is configured to select a segmentation for a line-end in the layout from
3 a set of predetermined line-end segmentations based upon intensity gradients
4 associated with the line-end.

1 27. (Previously presented) The apparatus of claim 26, wherein the
2 segmentation mechanism is configured to select the segmentation for the line-end
3 is selected based upon a magnitude of an intensity gradient associated with the
4 line-end.

1 28. (Original) The apparatus of claim 23, wherein the model-based
2 simulator is configured to:
3 divide each edge in the layout into minimum-sized segments; and to
4 perform the model-based simulation to determine an intensity gradient for
5 each minimum-sized segment.

1 29. (Original) The apparatus of claim 28, wherein while determining a
2 gradient for a given minimum-sized segment, the model-based simulator is
3 configured to perform a model-based simulation at two tangential points along the
4 segment to determine a tangential component of the gradient.

1 30. (Original) The apparatus of claim 29, wherein while determining the
2 gradient for the given minimum-sized segment, the model-based simulator is
3 configured to perform a model-based simulation at two points along a normal to
4 the segment to determine a normal component of the gradient.

1 31. (Original) The apparatus of claim 23, wherein the segmentation
2 mechanism is configured to perform the dissection again on problem areas in the
3 layout after initial OPC operations take place.

1 32. (Original) The apparatus of claim 23, wherein the segmentation
2 mechanism is configured to reduce the number of segments in areas that prove to
3 be simpler to correct than predicted after initial OPC operations take place.

1 33. (Original) The apparatus of claim 23, further comprising a calibration
2 mechanism configured to:
3 model an intensity gradient across a test pattern;
4 identify target regions in the test pattern that have a large amount of
5 correction shift variation;
6 map intensity gradients to the target regions;
7 associate segment lengths with the target regions; and to
8 produce an association between intensity gradients and segment lengths in
9 the target regions, whereby the association is subsequently used in generating the
10 segmentation for the layout.

1 34. (Previously presented) An integrated circuit created through a process
2 that dissects a layout for the integrated circuit based on modeled intensity
3 gradients to produce a segmentation for an optical proximity correction (OPC)
4 process, the process comprising:

5 receiving the layout for the integrated circuit;
6 performing a model-based simulation on the layout to generate intensity
7 gradients along edges of features in the layout, wherein the intensity gradients
8 include both magnitude and angle, and wherein an intensity gradient angle can be
9 in any direction with respect to an edge; and
10 generating a segmentation for edges in the layout based upon the intensity
11 gradients, wherein the segmentation is used by a subsequent OPC process in
12 generating corrections for the layout;
13 wherein the OPC corrected layout is used to generate a mask for
14 fabricating the integrated circuit.

1 35. (Previously presented) A mask for use in an optical lithography
2 process for manufacturing an integrated circuit, wherein the mask is generated
3 through a process that dissects a layout for the integrated circuit based on modeled
4 intensity gradients to produce a segmentation for an optical proximity correction
5 (OPC) process, the process comprising:
6 receiving the layout for the integrated circuit;
7 performing a model-based simulation on the layout to generate intensity
8 gradients along edges of features in the layout, wherein the intensity gradients
9 include both magnitude and angle, and wherein an intensity gradient angle can be
10 in any direction with respect to an edge; and
11 generating a segmentation for edges in the layout based upon the intensity
12 gradients, wherein the segmentation is used by a subsequent OPC process in
13 generating corrections for the layout;
14 wherein the OPC corrected layout is used to generate the mask for
15 fabricating an integrated circuit.